Claims

[c1]

1. A spread spectrum communications system, comprising:

(A)a transmitter, said transmitter further comprising:

(1)a data source;

(2)a first mixer spreading data from said data source with a first pseudo noise source (PNA);

(3)a second mixer spreading data from said first mixer with a second pseudo noise source (PNB);

(4)an RF transmitter;

(B)a receiver, said receiver further comprising:

(1)an RF receiver;

(2)a plurality of frequency shifters, receiving a signal from said RF receiver;

(3)a plurality of PNB matched filters receiving signals from said RF receiver and said plurality of frequency shifters;

(4)a plurality of frequency shifters, receiving a signal from said plurality of PNB matched filters;

(5)a plurality of PNA matched filters receiving data from said plurality of PNB matched filters and said plurality of frequency shifters; and

(6)an equalizer/decoder receiving signals from said plurality of PNA matched filters.

[c2]

2. A spread spectrum communications system, as recited in claim 1, wherein said PNA pseudo noise source provides a variable length code sequence.

[c3]

3. A spread spectrum communications system, as recited in claim 1, wherein said PNB pseudo noise source provides a fixed length code sequence.

[c4]

4. A spread spectrum communications system, as recited in claim 1, wherein said first mixer/multiplier spreads said data from said data source with a variable PN code PNA.

[c5]

5. A spread spectrum communications system, as recited in claim 1, wherein said second mixer/multiplier spreads said data from said first mixer with a fixed length PN code PNB.

[c6]

6. A spread spectrum communications system, as recited in claim 1, wherein said PNB matched filter further comprises a set of coefficients correlated to said PNB pseudo noise source.

[c7]

7. A spread spectrum communications system, as recited in claim 1, wherein said plurality of frequency shifters are offset from each other by one or more degrees.

[c8]

8. A spread spectrum communications system, as recited in claim 1, wherein said PNA matched filters are correlated to said PNA pseudo noise source.

[c9]

9. A spread spectrum communications system, as recited in claim 1, wherein said PNB matched filters are correlated to said PNB pseudo noise source.

[c10]

10. A spread spectrum communications system, as recited in claim 1, wherein said equalizer/decoder selects an advantageous signal from said received signals from said plurality of PNA matched filters.

[c11]

11. A spread spectrum communications system, as recited in claim 1, wherein said equalizer/decoder performs the steps consisting of:

(A)initializing an update magnitude;

(B)forming a complex equalization point;

(C)scaling and rotating said equalization point into position;

(D)forming a decision boundary to decode bits;

(E)generating an output bit along with and error vector normalized to the origin; and

(F)updating angle and magnitude parameters for the next bit.